STAT 482/682: Quantitative Financial Analytics

Date: Fall 2017
Time: TTH 1430 -1545
(Course 10936/10937)
Location: Duncan Hall DH 1042

Course Website – dobelman.rice.edu
We will also be using Canvas

Instructor

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Teaching Assistant (TA)

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Every.Sentence.Here.Is.Important™

Syllabus Outline

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Course Texts

Williams, Edward E. and John A. Dobelman, *Quantitative Financial Analytics: The Path to Investment Profits*, London: World Scientific, 2017. ISBN 978-981-3224-24-7

Magnus Erik Hvass Pedersen (2015), "*Strategies for Investing in the S&P 500"*, available for free download (with donation) at http://www.hvass-labs.org/books/

James O'Shaughnessy. *"What Works on Wall Street: A Guide to the Best-Performing Investment Strategies of All Time*", 4th Ed. New York: McGraw-Hill, 2011. ISBN: 0071625763

Benjamin Graham, Jason Zweig. "*The Intelligent Investor: The Definitive Book on Value Investing. A Book of Practical Counsel (Revised Ed)*," New York: Harper Collins 2006.

Various DEF 14A, 10-Q and 10-K available at
https://www.sec.gov/edgar/searchedgar/companysearch.html

Other Recommended Titles

Magnus Erik Hvass Pedersen (2015), "*Layman's Guide to Investing in the S&P 500*", available for free download (with donation) at http://www.hvass-labs.org/books/.

Benjamin Graham, David Dodd (2008), "*Security Analysis: Sixth Edition*", Foreword by Warren Buffett, McGraw Hill, New York

Greiner, Steven P. (2011), "*Ben Graham was a quant; raising the IQ of the intelligent investor*," Hoboken, New Jersey: Wiley.

Greenblatt, Joel, "*The Little Book that Beats the Market*"

Derman, Emanuel. "*My Life as a Quant: Reflections on Physics and Finance.*" Wiley: Hoboken, N.J. 2004. ISBN: 0471394203

Murphy, John J., *Technical Analysis of the Financial Markets: A Comprehensive Guide to Trading Methods and Applications*, New York: New York Institute of Finance, c1999. ISBN: 0735200661

Patterson, Scott. "*The Quants: How a New Breed of Math Whizzes Conquered Wall Street and Nearly Destroyed It.*" New York: Crown 2010. ISBN: 9780307453372

Schwager, Jack D*., A Complete Guide to the Futures Markets: Fundamental Analysis, Technical Analysis*, Trading, Spreads and Options, Wiley Interscience, 1984

Textbooks

Students are expected to have purchased their required texts during the first week of class. If the text is available at the "Rice" bookstore, and the student elects to purchase the book elsewhere, and this elsewhere-obtained book is not in hand, the student is nonetheless responsible for all assignments and readings. Rice University is generally not able to provide copies of these texts for your use.

Course Objectives and Outcomes

The course will provide a framework for a modern approach to fundamental analytics of securities; the classic works of Graham and Dodd; deconstructing the Efficient Market Hypothesis; Financial Statement Analysis; Capital Market Theory; CAPM; APT; Fama-French Empirical Financial Forecasting, and other data-driven approaches to portfolio construction and maintenance. Graduates of this course will be able to think like businesspeople, and stand head-to-head with both the quantitative analysts and the corporate finance masters'. Students

will be able to perform value-added quantitative financial analysis of a wide variety of scenarios in a minimum timeframe.

Course Approach

This is a project-based, Socratic lecture course; teamwork and class participation are required. It is designed to help prepare you for success in quantitative careers such as security analysis, portfolio management and financial data analysis. From time to time industry experts will be sharing their insights with the class in the form of guest lectures.

Course Content and Reading List

This course covers many topics, some of which you may be unfamiliar with. For a weekly schedule of topics and reading assignments, see the website READING LIST. We plan to cover most things which will arise as the course progresses. However, you should use a good online encyclopedia in case you have specific questions about topics we have not discussed yet, but which might arise while you are working on other assignments. Topics/chapters include

1. Foundational Vocabulary and Concepts; The Challenge; The Investment Environment; Venture Structure & Governance
2. Basics of Financial Mathematics: Summary Measures, Compound Interest, Present Values, and Yields
3. The Securities Markets and Macroeconomics
4. Financial Statement Analysis; Enterprise Valuation/Capital Structure and Cost of Capital
5. Essential Forecasting Techniques
6. Analysis of Fixed Income Securities, including rating agencies
7. Analysis of Common Stocks; Valuation models; Growth/risk, Convertibles, etc.
8. Futures and Options
9. Managing Risk and Uncertainty: Utility Theory, Portfolio Theory
10. Portfolio Analysis; Capital Market Theory; Efficiency and Imperfections

Grading

Grading for this course will consist of:

- Homework exercises (15%)
- "Mini-Projects" (25%)
- Final project (30%)
- Class Participation (20%)
- Team Evaluation (10%), consisting of self- and instructor evaluations.

The homework, mini-projects and final project are to be completed as team projects. Students taking the graduate-level STAT 682 will have additional assignments, with the same grading breakdown as STAT 482.

Building a Team

Building and working as a team are critical to your success in this course. You should form a team with requisite skills: good coders, good background in finance, excellent writing ability, and responsiveness to communications. The TA will be helping you put together your team, but it is your responsibility to form it.

Professional Standards

All assignments, with exception of handwritten math proofs and things of that nature, must be prepared in the form of a professional report. You should be able to take one of your reports/project write-ups and present to the management of your employer or advisor. This means you need to organize it with appropriate layout, graphics, citations, etc. Unnecessary printouts of numbers are not acceptable, nor are meaningless digits of precision, etc. The font should be large enough for management to easily read (no less than 10-point font, preferably 11-12). You should include a cover page indicating the class, assignment, date submitted, and name of student or group members and group number.

In the real world, if your management or customers cannot read the report, or if it is filled with superfluous information, they will just ignore it and possibly return it to you with a request to resubmit. If you are unlucky, they will just pass you over for someone who does these things better.

You are encouraged to make appointments with the peer consultants at the Center for Written, Oral, and Visual Communication for your assignments in this course. These consultants do not proofread or edit your work, but they will provide feedback on topics such as the organization of your paper or presentation, the coherence of your argument, appropriate sentence structure, and grammatical errors. You can make an appointment at the Center's website: http://cwovc.rice.edu/.

The Professional Standards checklist and other grading rubrics are posted on Canvas in the in the *Files/Policies_Professional Standards/* section. Besides outstanding examples of previous classwork in Canvas *Files/Projects/Gallery of Great Ones/*, several examples of good professional reports are contained in Canvas *Files/Policies_Professional Standards/Example Professional Reports/*. You should review several of these to get a flavor of what we are expecting from you.

Originality

Although some assignments are not "pledged", keep in mind that plagiarism is a serious problem, and is especially problematic for the student or researcher. Plagiarism will be treated, for pledged assignments, in accordance with the honor code provisions; and for non-

pledged assignments, your paper will be returned for a rewrite with the automatic deduction of one letter grade. By plagiarism we mean "quoting, paraphrasing, or otherwise using another's words or ideas as one's own without properly crediting the source." Unfortunately, with the prevalence of internet sources, it is sometimes easy to inadvertently commit plagiarism. You should consult this white paper and http://futureowls.rice.edu/futureowls/Honor_Code.asp for guidance on how to avoid this problem.

Citation

Any cited works in your reports must have citations listed, either as a separate section, or (less desirably) as footnotes. Exact citation format is your choice[1], but be consistent.

Use of Canvas

The Canvas system is the course management tool for announcements, assignments, resources, etc. Please do not email the instructor/TA questions about the course or assignments, but rather post as a discussion on Canvas so that all can see the conversation. If online submission for assignments is required, please upload in the appropriate area (usually in the assignments section).

Assignment Philosophy

Since this is an upper level course, some assignments may be posed in general, and sometimes (partially intentionally) "vague" language. The purpose of this is to help develop the student's analytical ability and skills to research new concepts and topics. A little research or coordination with the TA/instructor will generally lead to a fuller understanding of what is needed.

Assignment Submission, Lateness and Grading Policy

Unless otherwise instructed, all assignments must be submitted by the due date deadline as ***hard copy*** to the instructor or designee, with a *soft copy* submitted on Canvas as well. If hard copy is not received, no grade will be given. The instructors/TA will not be able to print e-mailed or online-only assignment submissions. Late papers will in general not be accepted without a university approved excuse. A 20% penalty for HW turned in by next class may be applied; no credit for submissions later than this, although you might be able to negotiate with the grader. Additional guidance on homework submission and project policies is posted on Canvas and is also available here.

Exams.

No examinations are planned for this semester. Two reading comprehension quizzes will be administered which will count with the mini-project assignment grading.

[1] See for example https://owl.english.purdue.edu/owl/section/2/

Mini-Projects

Mini-projects will be assigned during the semester in lieu of formal textbook or other research assignments. These are intended to be worked on in groups, and should utilize the efforts and ideas of the whole group for about a 2-week period. These assignments will be posted on Canvas. You may pick your own team members, but the size of each team will be limited to an appropriate number (no more than three to four).

Final Project

A final project will be assigned which will be completed in the groups/teams which you have previously established. Sometimes a quantitative case is provided, other times the project may be based on your own research ideas, or on the various case studies included in your textbooks. You and your team will select a case/topic, and submit a brief prospectus to the instructor for approval. More guidance on the final project will be given in class, and a Powerpoint presentation of project ideas is periodically updated and available on Canvas in *Files/Projects/Final Project/*

Attendance

Students are expected to attend class. Much material is presented in class which might not otherwise be in texts, notes, etc. We will also be having guest lecturers from time to time, and it is rude to the speaker if the class members are absent. Attendance will be reflected in the Class Participation portion of the course grade which contributes a full 20% of your grade. Although we plan on keeping the course website up to date, if a student misses a class, then he/she is responsible for keeping up with the course material and finding out if any exams, quizzes, or homeworks have been assigned or scheduled. Similarly, important due date changes might sometimes be made in class to your benefit which might not be immediately posted on Canvas.

Laptops and Wearable/Portable Electronic Devices (PED).

Unless so requested by the instructors, please do not use these devices during class, they are a distraction to other students. Prohibited devices include laptops, headphones, earbuds, gaming devices, mp3/music/media players, cell/smart-phones, PDA's, Kindle/e-book readers, tablet computers/readers, Apple watch/i* devices, multi-purpose wrist communicators, cameras, GPS/GIS devices, Google glasses, VR devices, etc. etc. Hearing aids are acceptable to use in accordance with the last item (disabilities) and procedures herein. From time to time the instructors may ask a student to look something up, but in most cases this is not necessary. If the student requests, such devices may be permitted, if the purpose is clearly articulated in advance. The student will be asked to put away their PED's if they are taken out in class; upon the second request, the student will be dismissed from class.

Software

It is impossible to perform statistical/quantitative data analysis today without some sort of computer software, and it is expected that the student will become proficient with one or more statistical software packages. The most widely used data analysis software in the real world

today is Microsoft Excel, and its capabilities are impressive. However, more specialized software is sometimes needed, such as Matlab, R/S-Plus, SAS, Python, SQL, Resampling Stats, SPSS, Stata, StatTools, StatExact, Lisrel, @Risk, Maple, Mathematica, C-Plex, etc. Of these, R and Python have become the choice of many because of their relative ease of use and low cost (FREE!) Download information for some of these packages is available on the course website(s).

One can also program most statistical procedures in a "high-level" programming language such as Java, C++, Fortran, VB, etc., along with specialized add-in routine libraries, but these require a lot of work to code and debug. Additionally, you will find that most corporate employers will not be paying for the nice software that is available for you here on campus. Consequently, to enhance your value to your future employer, we suggest that you become proficient in Excel, R/Python and SQL/SAS. Note that a good word processor will also be required in order to prepare reports and presentations; Microsoft Word, OpenSource, LaTeX, etc., are candidates for use in preparing these documents, although use of LaTeX in the business world is sparse.

Data Access

It is impossible to conduct quantitative financial *ANYTHING* without access to timely and accurate data. We are interested in pricing data, financial data, and in some cases economic data. In an era passed, much of the analysts' time was spent in back rooms pouring over company annual reports and slowly filling in the blanks on the columnar pad. Then the columnar pad was replaced with Visicalc and Lotus spreadsheets. These then turned into Microsoft Excel. And it remains this way today, except the annual reports are in some cases easier to obtain. (Unless you need annual reports very far into the past; it turns out most libraries no longer collect these reports).

A large part in developing your skills as quantitative analysts is being able to find the data that you need, to clean it, and prepare for its use in downstream analysis. Fortunately, with the internet things are very easy today. However, "cut and paste" from websites is becoming increasingly more difficult, even with Excel's capability for snatching data via web queries. This is in part because Excel web query development is not keeping pace with websites' tendency to not put data in static html table format[2].

For example, suppose you are trying to get the components of the United States S&P 500 index; at one time you could get them from finance.yahoo.com; however, as of 2012 Yahoo has discontinued availability of downloadable S&P500 constituents. The DJIA constituents are still available, but they have changed their method so that you have to download a page at a time which is a lot of work. You could get them in bulk from Standard & Poor's

[2] See, for example, http://www.cboe.com/DelayedQuote/QuoteTable.aspx. Enter a symbol, the data will appear but not be accessible via Excel web query because the query is based on static html tables.

(http://www.standardandpoors.com/indices/main/en/us), but you first have to have established a login/password, which takes a few hours.

Fee-based data vendors make data collection easier and more targeted or consistent; unfortunately, the access is expensive ($3,000-$10,000 per month), and no single vendor has everything you need (not even Bloomberg!) Fortunately for the Rice University student, several of the most expensive and useful databases are available, and we will be using them extensively. (WRDS CRSP and Compustat). We have established a class account for your use, and will provide limited overviews of how to use them, but it is your responsibility to learn how to navigate in the system and to validate the data that you might need to download.

Additionally, the Jesse H. Jones Graduate School of Business (JGSB) is providing us access to its El Paso Corporation Finance Center (EPFC). In the EPFC you will have access to several very expensive data vendors such as ARGUS Valuation, Bloomberg Professional, Capital IQ, FactSet, Morningstar Principia, Palisade @Risk, Reuters 3000Xtra, and S&P Research Insight. Use of these data sources is limited only by your imagination. You will need to attend the overview session and sign the access agreement in order to gain access. For more information watch for Canvas announcements and see the website: http://business.rice.edu/facility/el-paso-corporation-finance-center.

Rice Honor Code

Before enrolling in this course, you must understand and agree to abide by the Honor System in place at Rice University which protects the academic integrity of all coursework. All students (including graduate students) at Rice are bound by the Rice Honor Code. The Honor Code is a unique feature at Rice, one that is valued highly, and is of profound importance. New students should familiarize themselves with the Honor Code before starting classes. Honor Code violations are very serious, and can lead to dismissal from the University. Suspected violations will be processed in accordance with applicable procedures; see http://honor.rice.edu.

Examinations, if held, are conducted under pledged conditions. Proper recitation and use of the Honor Pledge on examinations will normally be worth 5% of the exam grade.

If homework and individual assignments/projects may be worked on with other class members, each student must submit their own work for credit. Homeworks should be submitted by each person, but you should indicate with whom you worked when applicable. No direct copying is allowed. Group projects and assignments may be submitted by the group, per submission requirements above.

Sponsored Message Regarding Student Responsibility

The Committee on Examinations and Standing has asked that we reiterate the responsibilities of the student to comply with deadlines affecting their status and standing. Essentially this

means that you need to be aware of the deadlines for which you alone are responsible (i.e., not your advisor, etc.). This data is maintained at registrar.rice.edu/calendars.

Summary of Links

Course Website - http://www.stat.rice.edu/~dobelman/courses/index.html
Software Downloads - http://www.stat.rice.edu/~dobelman/download/index.html
Canvas login - http://www.rice.edu/canvas/
Textbooks:
- QFA - http://www.worldscientific.com/worldscibooks/10.1142/10555
- Pedersen - http://www.hvass-labs.org/books/
- SEC filings - https://www.sec.gov/edgar/searchedgar/companysearch.html

Course outline and Schedule - http://www.stat.rice.edu/~dobelman/courses/Reading.682.txt
Professional Standards – http://tinyurl.com/yajmbkgd
Center for Written, Oral, and Visual Communication - http://cwovc.rice.edu/
Citation resources - https://owl.english.purdue.edu/owl/section/2/
Avoiding Plagarism:
- White Paper – http://www.stat.rice.edu/~dobelman/courses/Plagarism.Hewitt.2016.pdf
- Rice guidance - http://futureowls.rice.edu/futureowls/Honor_Code.asp

Data:
- WRDS/CRSP - http://wrds-web.wharton.upenn.edu/wrds/
- El Paso Finance Center - http://business.rice.edu/facility/el-paso-corporation-finance-center

Registrar academic schedules and deadlines - http://registrar.rice.edu/calendars/
Rice Honor code:
- Honor code - http://futureowls.rice.edu/futureowls/Honor_Code.asp
- Honor procedures - http://honor.rice.edu

Disability Support Services (DSS) - http://dss.rice.edu/

Disabilities

Any student with a documented disability needing academic adjustments or accommodations is requested to speak with the instructor during the first two weeks of class. All discussions will remain confidential. Students with disabilities should also contact Disability Support Services in the Ley Student Center. Further information is available at http://dss.rice.edu/.

Changes to Syllabus

Changes to this syllabus may be published from time to time, with notice and explanation given in class and via Canvas (if used).

[ToP]

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